AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

1. (Currently Amended) A method of forming a die surface onto a producing die to produce an optical element, wherein the die surface transfers an optical surface onto the produced optical element, the method comprising the steps of:

bringing a cutting tool to come in contact with a material so as to cut the material; and

moving the material relatively to the cutting tool so as to form the die surface with a curvature on the material;

wherein the material has a hardness ~~larger~~ not smaller than Rockwell hardness HRA 80 or Vickers hardness Hv 1000 and the cutting step is conducted to cut the material with a cutting-in depth of 1 μm or less, and

wherein the cutting tool has a cutting edge capable of coming in contact with the material, the cutting edge comprises a diamond and the cutting step is conducted while the cutting tool is set such that a single point of the cutting edge comes in contact with the material as a cutting point, and the cutting point of the cutting edge is fixed at the single point.

2. (Withdrawn) The method of claim 1, wherein in the cutting step that a cutting edge of the cutting tool and the material are relatively brought in contact with

each other at a cutting point, the cutting step is conducted while the cutting point of the cutting edge is continuously shifted along the cutting edge of the cutting tool.

3-4. (Cancelled)

5. (Previously Presented) The method of claim 1, wherein the optical surface is an aspherical surface.

6. (Previously Presented) The method of claim 1, wherein the die surface has an effective diameter of 5 mm or less.

7. (Original) The method of claim 1, wherein the cutting edge of the cutting tool comprises a diamond.

8. (Previously Presented) The method of claim 7, wherein the material is shifted relatively to the cutting edge of the cutting tool comprising the diamond in a direction predetermined on a basis of a crystal orientation of the diamond.

9. (Previously Presented) The method of claim 8, wherein the cutting edge of the cutting tool comprises a rake face facing forward in a cutting direction and a flank facing backward in the cutting direction for the transferring surface to be cut, and wherein a (110) surface of the diamond is used as the rake face.

10. (Cancelled)

11. (Withdrawn) The method of claim 8, wherein the cutting edge of the cutting tool comprises a rake face facing forward in a cutting direction and a flank facing backward in the cutting direction for the transferring surface to be cut, and wherein a (110) surface of the diamond is used as the rake face and the cutting step is conducted while the transferring surface is shifted relatively to the rake face along a (100) surface of the diamond extended in a direction intersecting with the rake face.

12. (Withdrawn) The method of claim 8, wherein the cutting edge of the cutting tool comprises a rake face facing forward in a cutting direction and a flank facing backward in the cutting direction for the transferring surface to be cut, and wherein a (110) surface of the diamond is used as the rake face and the cutting step is conducted while the transferring surface is shifted relatively to the rake face with an angle within a range of ±15 degrees for a (100) surface of the diamond extended in a direction intersecting with the rake face.

13. (Withdrawn) The method of claim 8, wherein the cutting edge of the cutting tool comprises a rake face facing forward in a cutting direction and a flank facing backward in the cutting direction for the transferring surface to be cut, and wherein the cutting step is conducted while the transferring surface is shifted relatively to the rake face along a (111) surface of the diamond.

14. (Withdrawn) The method of claim 8, wherein the cutting edge of the cutting tool comprises a rake face facing forward in a cutting direction and a flank facing backward in the cutting direction for the transferring surface to be cut, and wherein the cutting step is conducted while the transferring surface is shifted relatively to the rake face with an angle within a range of ±15 degrees for a (111) surface of the diamond.

15. (Previously Presented) The method of claim 9, wherein the rake face of the cutting edge has a rake angle within a range of ±15 degrees from a normal line perpendicular to the surface of material to be cut.

16. (Previously Presented) The method of claim 8, wherein the material is relatively rotated to the cutting edge of the cutting tool around the optical axis of the optical surface to be formed.

17. (Cancelled)

18. (Previously Presented) The method of claim 8, wherein the cutting step is conducted with a hyper precision processing machine having a control resolving power of 100 nm or less for a shaft to hold one of the cutting tool and the transferring die surface so that the position of the shaft is controlled within an error of 100 nm or less.

19. (Previously Presented) The method of claim 18, wherein the hyper precision processing machine has a moving section movable along 3-axes or more.

20. (Withdrawn) The method of claim 18, further comprising:

measuring the shape of the transferring surface formed by the cutting step;

obtaining deviations between the measure shape and an ideal shape; and

cutting again the transferring surface on the basis of the obtained deviations while shifting the transferring surface relatively to the cutting tool.

21. (Withdrawn) The method of claim 20, further comprising:

obtaining an error component of each item of the polynomial of Zernike on the basis of the deviations; and

judging the quality of the shape of the transferring surface by comparing the error component with a predetermined value.

22. (Withdrawn) The method of claim 20, wherein the producing die having the transferring surface is mounted on a rotating shaft of a processing machine to conduct the cutting step, and the measuring step is conducted without dismounting the producing die from the rotating shaft.

23. (Original) The method of claim 1, wherein the producing die is a producing die to form an optical element from a plastic material and the transferring surface transfers an optical surface onto the optical element.

24. (Original) The method of claim 1, wherein the producing die is a producing die to form an optical element from a glass material and the transferring surface transfers an optical surface onto the optical element.

25. (Cancelled)

26. (Previously Presented) The method of claim 1, wherein at least the material of the die surface of the producing die to be cut is a ceramic.

27. (Original) The method of claim 26, wherein the ceramic is a silicon carbide.

28. (Original) The method of claim 27, wherein the ceramic is a silicon carbide formed by chemical vapor deposition (CVD).

29. (Withdrawn) The method of claim 1, further comprising:

polishing the transferring surface after the cutting step.

30. (Withdrawn) A processing apparatus used for the method of claim 1.

31. (Withdrawn) An optical element producing die formed by the method of claim 1.